# Instrument for Determining Squareness or Perpendicularity

## *Instrument Speeds Determinations of Squareness or Perpendicularity of Machined Parts*

Innovation by EDWIN WHITE



The Measuring and Testing Unit of the Astrionics Laboratory has developed a measuring instrument that sharply reduces the number of personnel and time required to determine the squareness or perpendicularity of machined parts. Formerly, two men using an autocollimator or theodolite needed about six hours to meet the Marshall Space Flight Center's requirement of checking the perpendicularity of alinement pads on the ST–124 guidance platform of the Saturn vehicle. Now one man can do the same job in about one-half hour with the new Indicator Differential Measuring Device (IN–DIF).

IN–DIF (fig. 10) uses indicator differential gages to measure squareness and/or perpendicularity to 0.0001 inch.

The instrument was machined with two sets of three positioning pads (figs. 11 and 12) lapped at right angles to each other. The upright gage member (shown during assembly in fig. 12) has 19 holes, ⅜ inch in diameter on ½-inch centers, for insertion of the indicator differential gages. The gage holes are normal to the pads on the upright member and parallel to the pads on the base member. Each hole has a setscrew for fixing the gages in position.

Only a few simple steps are required to prepare the instrument for use. The device is positioned on a surface plate (fig. 11) so that it is resting on three pads (fig. 12) and the gage holes are perpendicular to the plate. The indicators are inserted into the selected holes, and the indi-

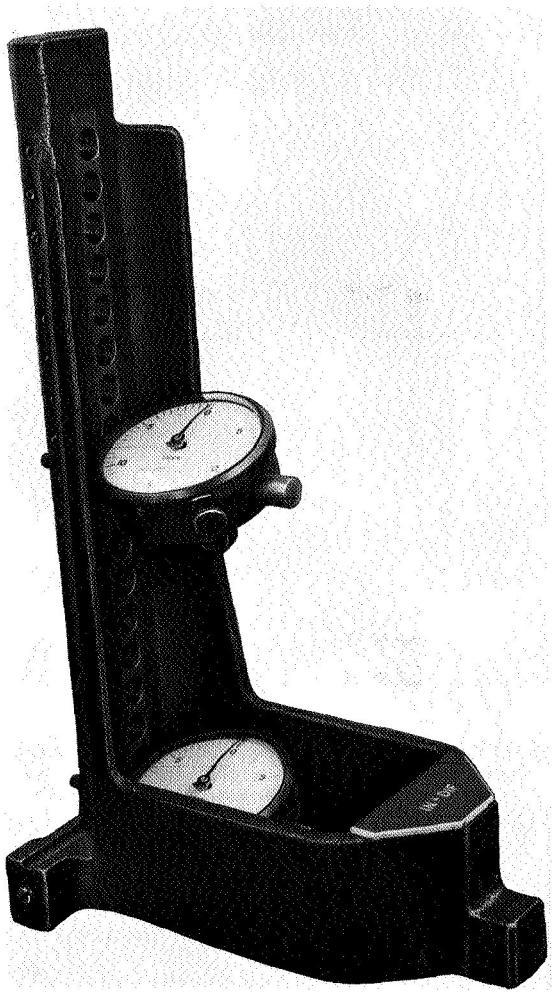

**FIGURE 10.—Indicator differential gage measuring device.**

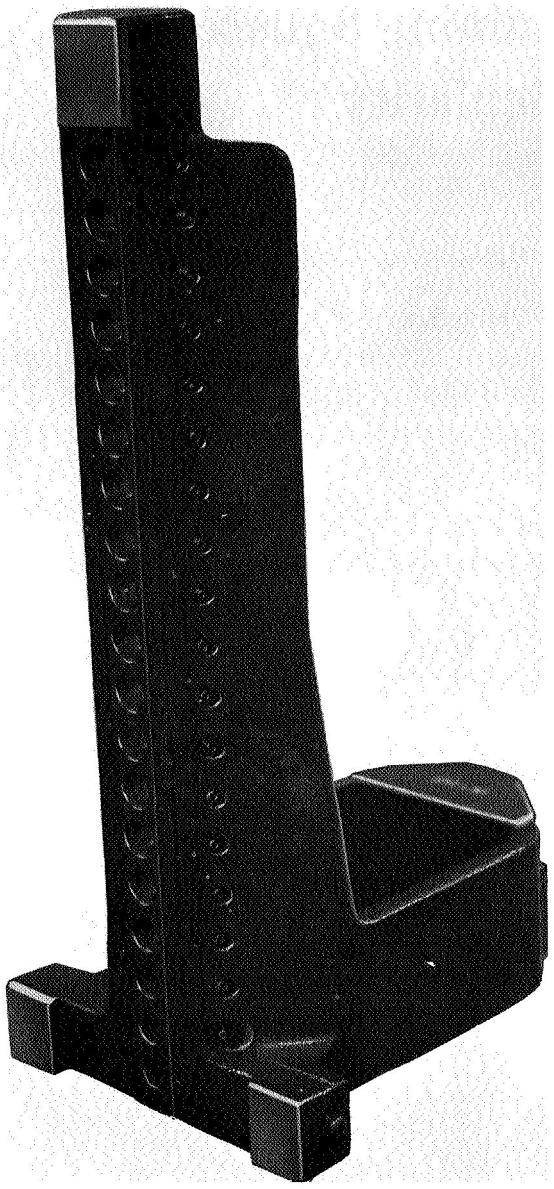

FIGURE 11.—Squareness and perpendicularity determining device positioned on surface plate and showing three positioning pads lapped in same plane.

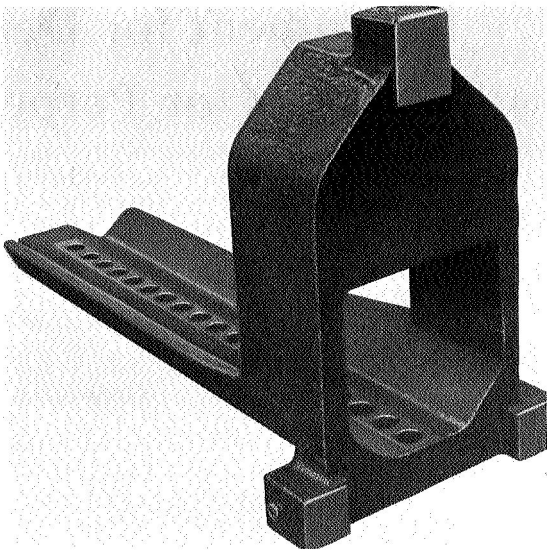

FIGURE 12.—Three positioning pads lapped in same plane and perpendicular to gage holes.

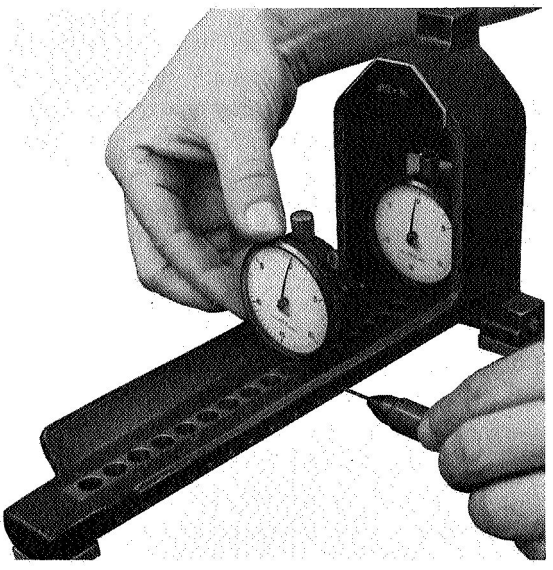

FIGURE 13.—Adjusting and securing indicator differential gages.

cator points are pressed against the surface plate until a plus reading is registered. The indicators are then secured in place with setscrews (fig. 13) and the dials zeroed. The device is then set upright and is ready for use. The indicator points are simply brought into contact with the work to be measured (figs. 14 and 15).

IN–DIF eliminates all vertical movement. The instrument can be set in ½-inch vertical increments, up to 10 inches. Slight angles can be determined because the difference in the readings of the two indicators, considering their spacing, is the sine of the angle.

The instrument was not intended for extremely accurate measurements where a fraction of a second of arc must be determined. Readings of such accuracy are seldom needed, however, and IN–DIF can perform most required measurements.

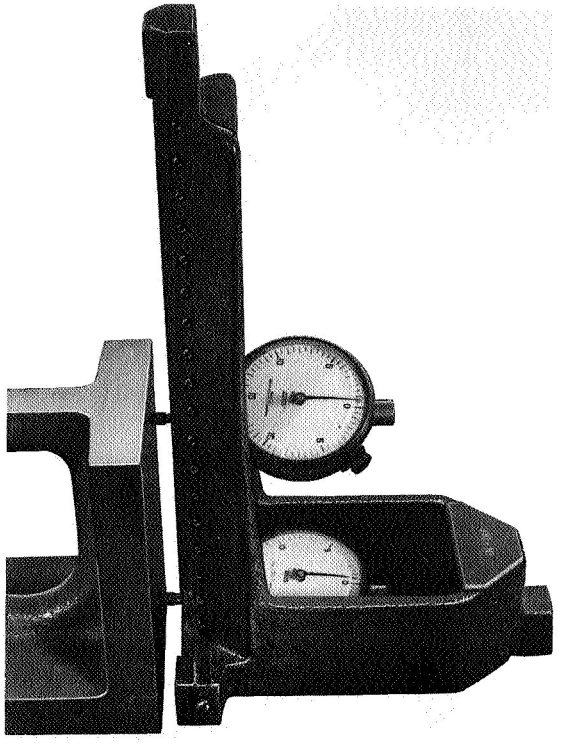

FIGURE 14.—Determining squareness and perpendicularity of machined part.

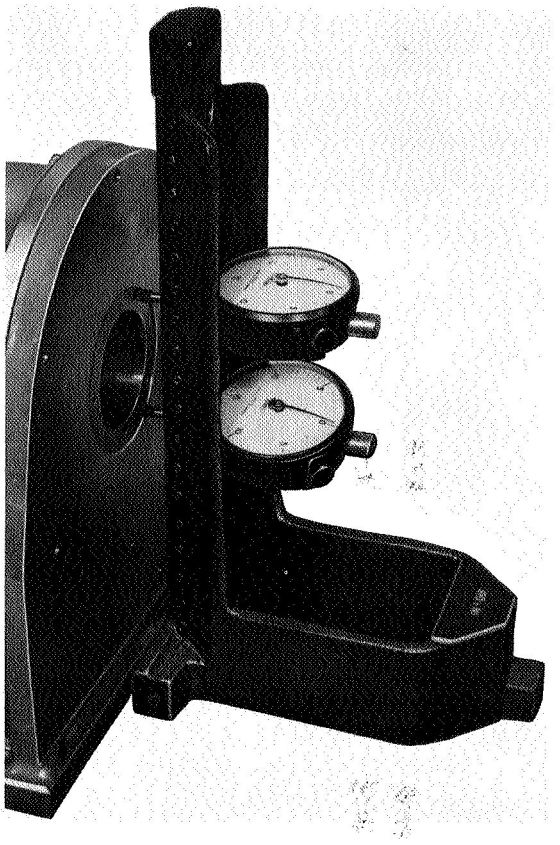

FIGURE 15.—Determining squareness and perpendicularity of machined part.